CLAIMS

What is claimed is:

1. An electric synchronous machine, comprising:

   a stator having a winding with an average coil width τsp;

   a rotor having a pole pair number 2p with a pole pitch width τp; and

   permanent magnets attached to the rotor,

   wherein a pitch ratio $\tau sp/\tau p$ is greater than or equal to 2.5.

2. The synchronous machine of claim 1, wherein the winding is a three-phase AC winding.

3. The synchronous machine of claim 1, wherein the pitch ratio $\tau sp/\tau p$ is defined as $(2n \pm 1) - x \leq \tau sp/\tau p \leq (2n \pm 1) + x$, wherein n is an integer number ≥ 2, and x has a value of 0.5.

4. The synchronous machine of claim 1, wherein the permanent magnets are arranged in a flux concentration arrangement.

5. The synchronous machine of claim 4, wherein magnetic field lines of the permanent magnets extend essentially tangentially to the rotor, so that the magnetic field lines of the permanent magnets are concentrated in an air gap between the rotor and the stator.

6. The synchronous machine of claim 5, wherein the rotor is an inner rotor, with the permanent magnets secured on the inner rotor by at least one element selected from the group consisting of bandage and magnetically conducting sleeve, wherein the element at least partially surrounds the rotor.

7. The synchronous machine of claim 6, wherein the element conducts the magnetic flux.

8. The synchronous machine of claim 6, wherein the sleeve has a laminated structure.

9. The synchronous machine of claim 1, wherein the rotor is made as a single piece having generally axially extending recesses, wherein the permanent magnets are received in the recesses.

10. The synchronous machine of claim 5, wherein the rotor is an outer rotor, with the permanent magnets secured on the outer rotor by one element selected from the group consisting of a sleeve and a ring, wherein the element is made of non-magnetic material.

11. The synchronous machine of claim 10, wherein the non-magnetic material includes aluminum.

12. The synchronous machine of claim 1, wherein the stator is made of a plurality of materials having different magnetic conductivities.

13. The synchronous machine of claim 11, wherein at least one of the plurality of materials is a composite material.

14. The synchronous machine of claim 1, in the form of a linear motor.

15. Use of an electric synchronous machine of claim 1 in machine tools, production machines or with electric drive assemblies in vehicles.